simple long vowels in such cases. In this primer these two glides are not used with *ā* and *ō*. To call the *r* glide, as in *hear*, a very soft *r* is misleading, as most of us in the eastern United States pronounce absolutely no *r* at all in such words.[1] Here, too, what is said of American pronunciation is inexact; for surely we all have an *r* glide in words like *hearing*, while an English reader of Mr. Bell's words would suppose that Americans pronounce *hear* as he does, but *hearing* like *he-ring*. The American rule for the *r* glide may be thus stated for some, perhaps most of us: when the *r* glide is present at the end of a word, it is retained before any ending of derivation or inflection, the consonant *r* being pronounced in addition after the glide if the ending begins with a pronounced vowel. Thus the glide is heard in *boor*, *boorish*, *beer*, *beery*, *soar*, *soaring*, *store*, *storing*, *stored;* but there is no *r* glide in *Mary*, *story*, *fury*. Cases like these last seem to have been excluded from the book.

[1] See Whitney, The elements of English pronunciation, in his Oriental and linguistic studies, second series.

## *WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.*

### CHEMISTRY.

*(General, physical, and inorganic.)*

**New explosive.** — S. H. Hinde proposes a new explosive mixture composed of 64 parts of nitro-glycerine, 12 ammonium citrate, 0.25 ethyl palmitate, 0.25 calcium carbonate, 23 coal, 0.50 sodium carbonate. — (*Chem. techn. repert.*, 1883, 153.) C. E. M. [196

**Compressed cartridges.** — H. Güttler makes cartridges of compressed blasting-powder, which are bound together by dextrine. For this purpose he uses a hard burned charcoal (brown-red), which he claims has the formula $C_8H_4O_2$. The mixture of charcoal, sulphur, and nitre are incorporated with the solution of dextrine, corned in grains of one to two millimetres; and after drying they are pressed into perforated cylinders. These cylinders are then dried and shellacked. The reaction due to explosion is represented, when India nitre is used, by $C_8H_4O_2 + 8\,KNO_3 + 4\,S = 8\,CO_2 + 2\,H_2O + 8\,N + 2\,K_2SO_4 + 2\,K_2S$. — (*Chem. techn. repert.*, 1883, 154.) C. E. M. [197

**Fulminating compound.** — B. G. and F. L. Benedict have invented a mixture for use in primers, in place of fulminating mercury, consisting of 2 parts amorphous phosphorus, 8 of minium, and 2 of potassium chlorate. The oxides of mercury or manganese may be used in place of the minium. — (*Chem. techn. repert.*, 1883, 153.) C. E. M. [198

### AGRICULTURE.

**Soluble and insoluble phosphates.** — In experiments on potatoes, Swanwick and Prevost obtained a larger yield on plots manured with superphosphate than on those manured with the same phosphate simply ground. A slight increase in the percentage of starch was observed in the potatoes manured with superphosphate. — (*Bied. centr.-blatt.*, xii. 250; *Trans. highl. agric. soc.*, 1882.) H. P. A. [199

**Value of artificial butter.** — There are, according to Ad. Mayer, three principal points to be regarded in judging of the worth of an article of diet; viz., harmlessness, taste, and physiological utility. That artificial butter is harmful can hardly be seriously claimed; while, as regards its taste, the very magnitude of the industry shows that the imitation is very successful. The physiological utility of artificial butter depends essentially on its digestibility; and on this point Mayer has experimented, using as subjects a man, and a boy nine years old. But slight differences were observed between natural and artificial butter; but the former was digested a trifle better. When the artificial butter was used in preparing potatoes, it proved to be almost uneatable; and the author suggests that this fact may prove of use in detecting the presence of the former. — (*Landw. vers.-stat.*, xxix. 215.) H. P. A. [200

**Butt and tip kernels of corn.** — The vegetation of the butt, central, and tip kernels of corn in the field has corroborated the results already published as gained in the greenhouse. The figures of vegetations stand as below: —

| Planted. | Butt kernels. | | Central kernels. | | Tip kernels. | |
|---|---|---|---|---|---|---|
| | June 1. | June 4. | June 1. | June 4. | June 1. | June 4. |
| 1 A 1, May 16 | 446 | 533 | 551 | 581 | 564 | 600 |
| 1 A 2, " | 478 | 534 | 515 | 564 | 564 | 583 |
| 1 A 3, " | 497 | 558 | 490 | 570 | 500 | 549 |
| 1 A 4, " | 428 | 496 | 463 | 560 | 519 | 587 |
| 1 A 5, " | 362 | 467 | 456 | 526 | 428 | 526 |
| Total vegetated | 2211 | 2588 | 2485 | 2801 | 2575 | 2845 |
| Total planted | 3420 | 3420 | 3420 | 3420 | 3420 | 3420 |
| Per cent vegetated | 64 | 75 | 72 | 82 | 75 | 83 |

— (*N. Y. agric. exp. stat., bull.* xlvii.) H. P. A. [201

**Chemistry of asparagin.** — B. Schulze finds that asparagin is not decomposed to any notable extent by heating with water, even under a pressure of three to four atmospheres, and in the presence of acid plant-juices. Consequently, when fodders containing asparagin, of which there are many, are cooked, this substance is unaltered; and, since its nutritive value has been established, the knowledge of this fact is of some importance. When heated with alkalies, asparagin yields asparaginic acid and ammonia, while a portion of the acid is further acted on, and malic acid is formed. — (*Landw. vers.-stat.*, xxix. 233.) H. P. A. [202

## METEOROLOGY.

**Observations on Ben Nevis.** — A permanent observatory is to be established at the summit of this mountain by the Scottish meteorological society. A road to the summit has been begun: the building will be erected this summer, and it is expected that regular observations will be made after Nov. 1. The records will be kept hourly, not only at the summit, 4,406 feet above sea-level, but also at Fort William, which is situated twenty-eight feet aboye the sea, and at the base of the mountain. Since June 1, 1881, simultaneous observations at these points have been made at frequent intervals of the day, in the summer-time, by Mr. and Mrs. C. L. Wragge, the former of whom made the ascent every day until the storms of October rendered this impossible. The results obtained have been discussed by Mr. Buchan sufficiently to warrant the permanent establishment of the observatory. — W. U. [203

**The origin of lightning.** — In explaining satisfactorily the phenomenon of lightning, a difficulty is encountered in accounting for the enormous electric tensions which are necessary to explain the great length of the spark often observed. The theory is advanced by A. Fick, that the high tensions are produced by the sudden concentration of electricity already existing in a free state. This concentration is caused by the formation of large drops of rain from the small vesicles of moisture existing in the clouds, by which the surface upon which the electricity exists is greatly diminished. The sudden formation of drops of water from the mass of aqueous vapor may be due to the advance of cold-air currents. The author endeavors to answer two objections which may be urged against his theory: 1. That in every rain-storm lightning ought to be seen; 2. That it ought to rain whenever it lightens. To the first objection he replies, that the drops may be formed gradually, and not suddenly, in which case the tensions would be dissipated gradually; and, to the second, that drops are always formed in connection with lightning, but that in falling to the earth they sometimes encounter a layer of dry air, and are absorbed in their passage. — (*Naturforscher*, June 23.) W. U. [204

## GEOGRAPHY.

(*Arctic.*)

**News from Bering Sea.** — News to July 8 has been received from the North Pacific whaling-fleet. The promise of a late spring had been fulfilled to date. Large quantities of drift-ice were afloat in Bering Sea some distance south of Bering Strait as late as the end of June. The whalers had taken but few whales, — only nine for the whole fleet. St. Lawrence Bay did not open until July 1. The Leo, bound for Point Barrow to relieve the party at the U. S. international polar station, had arrived at Plover Bay July 5. During the last few days of June strong southerly winds prevailed, driving the ice northward, so that at least one of the steam-whalers was able to reach ten leagues north of Cape Lisburne. The Corwin had not arrived. The bark Mary and Susan had been nipped, and was leaking badly; and the steam-whaler Balaena had returned to Plover Bay with the loss of her propeller-blades. Most of the fleet met south of St. Paul Island, in latitude 57° N., in April, and were fast in the ice from forty to eighty days, encountering very heavy ice and severe cold. The whales in their northward migration passed Cape Chaplin about July 9. The bark Hunter had been injured by a serious fire in the forecastle. A small number of walrus had been taken in default of larger game. Notwithstanding the unfavorable spring, a few weeks suitable weather may change the conditions sufficiently to enable the fleet to make a fair season's catch; but it must be confessed that the prospect of this, as well as for the Leo's reaching Point Barrow, and securing the desired observations there, are not encouraging. — W. H. D. [205

(*Africa.*)

**Revoil's journey to Somali-land.** — M. G. Revoil, recently intrusted with the direction of an expedition to Somali-land by the French ministry of public instruction, left Zanzibar about the first of May. During detentions at Aden and Zanzibar, collections of natural history and ethnology were obtained, and the members of the party instructed in the methods of work. Friendly relations were established with several chiefs of the Somali coast, who were on an annual visit to Zanzibar, and recommendations to various tributary chieftains obtained from the sultan. M. Revoil intended to enter the country with Arab guides at Mogadoxo. and to ascend the Wabbi River to Geledi, whence, after a short stay, he would proceed to Gananeh on the Juba River, which he would endeavor to map, while obtaining collections of all kinds. After this the Juba would be ascended to the region of the Ugadines toward the west, or he would enter the Galla country toward Kaffa and Shoa, where it is thought the friendly relations of the French with King Menelik would insure him a favorable reception. It is expected that the journey will terminate by traversing the country to Harrar, and thence to Zeila on the Gulf of Aden. — (*Comptes rendus soc. géogr.*, no. 11.) W. H. D. [206

## ZOÖLOGY.

Mollusks.

**Existence of a shell in Notarchus.** — Vayssière has demonstrated the existence of a minute internal spiral shell in Notarchus. Taken into consideration with a similar discovery by Krohn in Gasteropteron, the author thinks it very probable that both are persistent embryonic shells (in Notarchus it is about one-fiftieth as long as the animal itself), and that an analogous appendage will be found eventually in most tectibranchs, which, up to the present time, have been considered shell-less. — (*Journ. de conchyl.*, xxii. 4.) W. H. D. [207

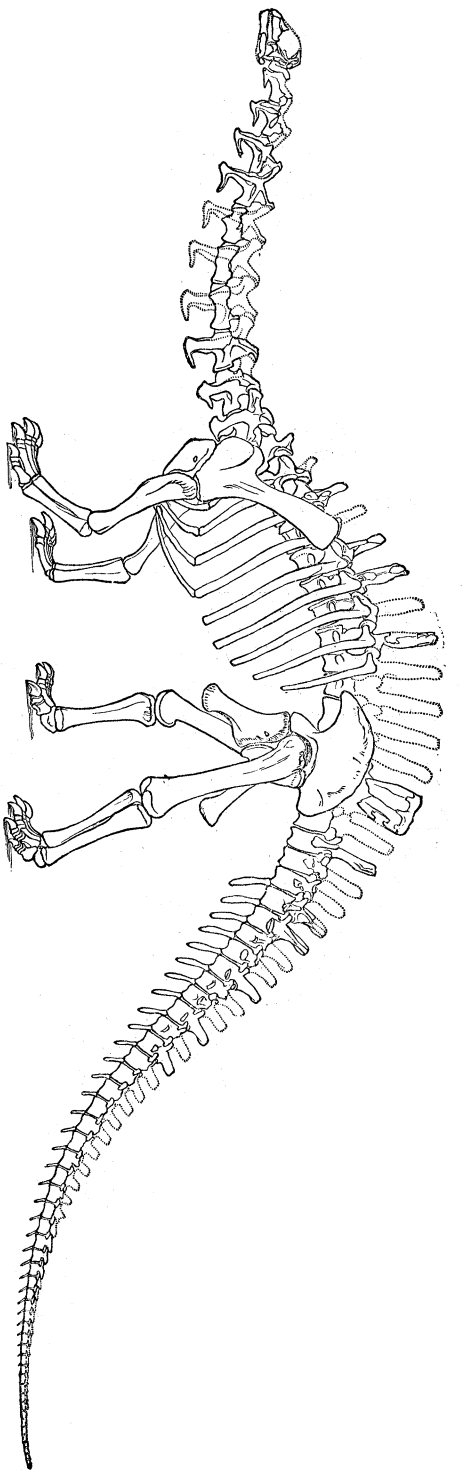
**New abyssal mollusks.** — Fischer describes a number of new species from the deep-sea dredgings of the Travailleur in 1882. They belong to the genera Dentalium, Mitra, Sipho, Pseudomurex, and Belomitra. The latter is a new genus resembling Bela, but with numerous small plications on the columella.

One species, Mitra cryptodon, comes from a depth of 1,900 metres in the Atlantic, — probably the greatest depth recorded for any species of that genus up to the present time. — (*Journ. de conchyl.*, xxii. 4.) W. H. D. [208

## VERTEBRATES.

### Reptiles.

**Restoration of Brontosaurus.** — In the continuation of his papers on Sauropoda, Marsh gives the accompanying restoration of Brontosaurus almost entirely from a single individual about fifty feet long. "The head was remarkably small; the neck was long, and, considering its proportions, flexible, and was the lightest portion of the vertebral column; the body was quite short, and the abdominal cavity of moderate size; the legs and feet were massive, and the bones all solid; the feet were plantigrade, and each footprint must have been about a square yard in extent; the tail was large, and nearly all the bones solid." Special attention is drawn to the head, which is "smaller in proportion to the body than in any vertebrate hitherto known," the entire skull weighing and measuring less than the fourth or fifth cervical vertebra. The animal is estimated to have weighed more than twenty tons, was more or less amphibious, probably fed on aquatic plants, and was doubtless a 'stupid, slow-moving reptile,' wholly wanting any offensive or defensive weapons. — (*Amer. journ. sc.*, Aug.) [209



RESTORATION OF BRONTOSAURUS.

### Mammals.

**Influence of pressure on heart-beat.** — Many observers have noticed that the mammalian heart, after the death of the animal, will, under certain conditions, continue to beat spontaneously for some hours, especially if artificial inflation of the lungs is kept up. Ewald and Kobert have made some observations on this subject, inflating the heart directly with air, and find that hearts which have ceased to beat spontaneously, or after the application of mechanical stimuli, will again give contractions when the pressure within their cavities is raised. They come to the conclusion that one of the conditions which the blood must fulfil, in order to maintain the heart in activity, is, that it must exert a certain pressure on the heart-walls. — (*Pflüger's archiv*, xxxi. 187.) W. H. H. [210

**Epiphyses on the centra of the vertebrae of the manatee.** — M. Albrecht describes these rudimentary epiphyses at length. He believes that the presence of crests and furrows upon the intervertebral faces is a sure indication of epiphyses; but he goes further, and describes these processes. They are 'partially ossified in a peripheral zone, particularly in the dorsal region.' He also forms the hypothesis that the epiphyses are the remnants of more perfect ones, basing it upon the fact of the presence of the ridges and grooves upon the faces of the centra. — (*Bull. mus. hist. nat. Belg.*, ii. 1883, 38.) F. W. T. [211

## ANTHROPOLOGY.

**The skulls of assassins.** — A short time since, attention was called to the investigations made upon criminals and delinquents, with a view to study the

early stages of humanity. The discussion is kept up by the French society, and most elaborate measurements are reported. M. Dally is not quite satisfied with the methods, however, and makes the following remarks. It is very wrong to confound things different *inter se* under one abstract term, and to study them as a natural group. Assassins, murderers, criminals, and even the assassinated, constitute juridical categories; but surely they are not philosophic. Highwaymen, ravishers, the jealous, monomaniacs, avengers, nihilists, etc., may be assassins; yet they have nothing in common, except that their actions lead to the same result. The organic conditions which lead to murder are quite different in each case. Again: every one knows that nothing is more rare than a perfectly symmetrical skull. Before establishing the proportions of anomalous crania among criminals, it is necessary to fix the standard among the virtuous. In fact, all men who have heavy lower jaws are not necessarily assassins; nor can we assume that all crime is evidence of atavism, and argue, hence, that in the anatomy of murderers we have the portraits of our prehistoric ancestors. — (*Bull. soc. anthrop. Paris*, v. 778.) J. W. P. [212

**Easter Island.** — Commander Bouverie F. Clark, in June last, visited the Easter Island, landing at the village of Malaveri, where the vessel was boarded by Mr. Alexander Salmon, agent of the Maison Brander of Tahiti, who purchased the property of the missionaries four years ago. The latter then left for the Gambier Archipelago, taking three hundred natives with them. The natives now number a hundred and fifty, and are decreasing. About five hundred were shipped to Tahiti eight years ago, to work on the plantations of the Maison Brander. Among the remaining people are no traces of the missionary work. They are divided into several small clans; and their chief quarrels are about the first eggs of the 'wide-awake' every year from Needle rock. The myth or tradition of their arrival is given by Commander Clark, who also speaks hopefully of the fertility of the island, as well as its value as a provision station. — (*Proc. roy. geogr. soc.*, v. 40.) J. W. P. [213

## *INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.*

### PUBLIC AND PRIVATE INSTITUTIONS.

#### University of Michigan.

*Central laboratory for microscopy and general histology.* — Instruction is given in this laboratory in the following subjects. 1. Microscopical technics, or the science and art of microscopy, comprising, (*a*) the theory and construction of the instrument and its various accessories; (*b*) the methods of determining magnifications; (*c*) the methods of microscopic drawing, microscopic photography, and microscopic projections; (*d*) the preparation of objects of various classes. 2. Human histology. 3. Comparative histology. 4. Vegetable histology. 5. Dental histology. 6. Pathological anatomy. 7. Completion of microscopic study in such other subjects as may be desired by professors in charge.

The following is the plan pursued in the principal divisions: —

Normal human histology. — This course consists of thirty lectures in the amphitheatre on the use of the microscope and on histology. In laboratory work the student is taught the manipulation of the instrument, use of accessories, etc. Then follows the study of such subjects as blood, epithelium, bone, tooth, cartilage, elastic tissue, muscle, kidney, stomach, liver, intestine, brain, spinal cord, and various miscellaneous subjects, as the oesophagus, tongue, skin, etc. The students are given instruction in mounting, so that each specimen is preserved as it is studied. The average number of mounts per student is about twenty. Each student is required to have at least twelve mounts, and some ambitious ones mount as high as fifty or sixty. Over six thousand mounts are carried away each year by students in this department. The object of the course is, first, to make the student better acquainted with the structure of tissues, and, second, that he may become familiar enough with the microscope and its manipulations to work to advantage without the aid of an instructor.

Vegetable histology. — The first course consists of work in structural botany for a term of twenty weeks. Special attention is given to the correct representation of microscopic objects on paper. Sixty accurate drawings of the various structures examined during the course are required of each student, the specimens being prepared by the students themselves. Vegetable protoplasm is studied with the special view of ascertaining the effects of the various reagents employed in general laboratory work. Then follow lessons on the vegetable cells, diatoms, and other miscellaneous subjects.

Course two in vegetable histology consists of work in pharmaceutical botany, three forenoons of laboratory work each week for twenty weeks. At the close of the course each student chooses a particular drug, studies it thoroughly, and presents the results of his labors in the form of a thesis.

Advanced normal and pathological histology. — Any student who has completed the primary course in the histological laboratory, or who has performed an equivalent amount of work in some other institution, can enter the class for advanced work. The first work here is in testing objectives with test-plates and diatoms, and in becoming more familiar with a few useful accessories. The art of injecting is then taken up, and the frog and cat are experimented upon, as well as individual organs from larger animals. Each student then chooses some particular organ or tissue, and prepares it in as many ways as possible for study. He thus becomes